Answers to office action summary
Application 10/686,914 by Erez Yahalomi

Figures 13-15 are described in pages 18-20 in the last submission. In the initial version of the application the device principle of figure 13 is described in the detailed description of preferred embodiment part at the section described figure 1 and 10. Figure 10 described a switching device wherein the states are determined by a charge current value. The current value is controlled by an adjacent element the particles inside this element can change their charge distribution between two regions 44, 47 in the recent version, or in fig1and fig 1b or fig. 6a and fig. 6b in the initial version. Wherein the charge distribution depends on the particles energy, which can be mediated by electric energy as mentioned in claim 15 in the initial version.

In the initial version the device principle of figure 14 is described in the detailed description of preferred embodiment part at the section describing figure 10. Figure 10 described a switching device wherein the states are determined by a charge current value in element similar in principle to inversion layer 88 in fig 14 in recent version. The current value is controlled by an adjacent element particle where particle inside this element can change their charge distribution similar in principle to change in charge distribution in element 94 in figure 14. Where the charge distribution change in the figure 10 can be achieved by electric potential as in figure 14 of recent version.

In the initial version the device principle of figure 15 is described in the detailed description of preferred embodiment part at the section describing figure 11,12 where in particle inside a container can be expanded or contracted by two adjacent planes with the same charge sign similar to elements 122, 128,130 in figure 15.The influence of inversion layer conductance in figure 15 is similar to the conducting element in fig 10 in the initial version.

Regarding claim 22 "the particle state can be revert do to particle bounding to initial state" refer to a region where there are particles in opposite charge sign to the translatory particle and the translatory particle is located there in one switching state. After the translatory particle is moving away from this region to a second region these particle could attract the translatory particle back to region one when the mediated

energy that caused the particle to move away from region one is vanished or the particle could move back to region one by another energy for example an electric energy on the opposite direction to it's initial movement. Claim 22 refer also to fig 9b, particle 32 is located in the bottom region of container 31 refer to region one. The particle can move to the higher region referred of container 31 as second region between the conductive planes 29,30. The particle can move back to first region by

by electric field or energy refer to as inverting energy or by attracting to oppositely charged particles located in region one.

Regarding claim 23 the phrase limited region refer to the unscreened region 34a approximately in the center of the screening element 34 at figure 10.

Regarding claim 45 the term polarization refer to an electrical charged entity with equal and opposite charged maintained at a distance away from each other.

Regarding claim 1 the application described devices that applied the physical quality that size change of charged particle wave function change the particle electric field and electric force . This change in electric field and force allows to determine two different states realized as a switching devices.

Kane described a switching device that use in indirect way hyperfine interaction and exchange interaction .The hyperfine interaction is a magnetic interaction several orders smaller than the electric field interaction, which I applied. In the hyperfine interaction the wave function size can change the contact term, which describes the interaction on nuclei magnetic field and the magnetic moment of the electron. This term is depend on the overlap between electron and proton wave function, the electron wave function size change can change the overlap which influence the magnetic interaction between spin and nuclei. Kane also use exchange interaction between electron spins that depend on the spins states and the interference between the overlap electrons wave functions.

To emphasize the significant difference between Kane method and my method. claim 1 has amended by included the limitation that switched state is determined by electric field or force of derived from the particle wavefunction distribution.

Regarding claim 2 is now related to the modified claim 1, which give a different purpose the wave function compared to Kane device.

Figure 2 in Kane paper state the electron wave function is pulled toward the barrier (and thereby deforming it's shape in the figure) it is not mention increasing or decreasing the overall volume of the wavefunction.

Regarding claim 5 is related now to the modified claim 1 ? (that not appears in Kane paper)

Regarding claim 6 applying voltage to Kane J gate indeed change the potential and the total energy but don't have to change the particle kinetic energy. The wave function expands by changing the potential barrier value. herby claim 6 of changing the particle wave function size by change in particle kinetic energy is valid.

Regarding claim 7 is related now to the modified claim 1.

Regarding claim 16 and Field paper. claim 16 described a close system related to claim 1, in Field there is an open system wherein the particle enter the container – the dot and exit on the other side.
Regarding claim 21 and Field paper. In claim 21 the electric change that is measured is during the transition process between contracted particle wave function state to expanded wave function state this transition is continues thereby induced current on the conductive element but very fast several orders faster than the electron mobility in the dot described at Field.

Regarding claim 22 and Field paper. The two region system in claim 22 is a closed system wherein the particle can move to second region and back to first region and always in one of the two regions, while in Field the electron move to the dot from a connector and later exit the dot to other connector on the other side of the dot and continue to other external parts of the circuit.

Regarding claim 28 is related now to the modified claim 1 (that not appear in Kane paper)

b- does not appear in Kane, in Kane the potential can be only rippled or only attracted.

Regarding claim 30 the detectable states in the application is electric field values related to charge distribution. In Kane the states are two coupled electron spins , what is measured is electric current that only occurred in two coupled electron in a singlet state bound to the same donor.

Regarding claim 31 is related now to the modified claim 1 ? (that not appear in kane paper).

Regarding claim 37, kane described a shift in electron wave function location in fig.2 and change to a larger or smaller extent of the wave function (page 135 lines 14-16,kane).

Regarding claim 38 the electric charge elements are measure electric charge distribution while in Kane it measure nuclear resonance frequency.

Regarding claim 39 the electric charge elements are measure electric charge distribution while in Kane it measure nuclear resonance frequency.
Kane electric charge elements give capacity change wherein claim 39 the charge element gives current change.

The allow subject matter claims were revised as suggested.

After the technological scientific discussions will be completed I will secure the services of a patent attorney for final modifications of the application and I will submit a formal drawing of figures 13-15.

Best Regards,
Erez Yahalomi
Erez Yahalomi

Device in Figure 12 contained two adjacent regions **40,41**, particle wave function is denoted by diagonal stripes and detector 43.

The operation of device is heuristically suggested in fig 12: first switched state is denoted by a particle wave function in a single region in container 41, second switched state in figure 12b is denoted by an expanded particle wave function located in region 40 and 41. The detection method **43** is for example any of the method described in previous . The methods for change the particle energy can be any of the method described in the present patent.

Following embodiment describe in more details the devices construction in the present invention.

Figure. 13 Related to the first and fourth embodiments. Particle wave function can be in one region or expended to a second region too as suggested in first embodiment, the switched state are detected by an electric conductor as suggested in the fourth embodiment. Switching device denoted 50 is schematically described in fig 13. Device 50 include layer 52 of silicon with phosphorous dopants concentration of 10 sup 17 centimeters sup -3, undoped Si layer 54, silicon oxide insulators layers 56,58~~, undoped Si layer 58~~, Aluminum based metallic contacts 60,62,68,70,silicon oxide insulators layer 64,65 Aluminum conductor 66. Layers 52 have a cross section of 4 microns by 2 microns and 200-angstrom thickness.

The operation of device is heuristically suggested in Fig 13. A voltage bias is applied to contact 60 of negative charge relative to contact 62 of positive charge without inserting electrons into layer 52. The potential difference increase the kinetic energy in the n type electron inside layer 52, then electrons wave function expand into silicon layer 54, the expanded electric charge distribution in layer 54 is changed the potential difference between metallic contacts 68,70 said contact are connected in parallel to Aluminum conductor 66 thereby conduction current in Aluminum conductor 66 is changed.

Sixth preferred embodiment is a switching device generally denoted 80 is described in fig.14 and related to the fourth embodiment. Expended wave function influence the conduction on a near by conducting channel. Device 80 is consist of 82 a back source layer , 84 is doped silicon layer with boron atoms, 86 is inversion layer,88 is p type source region, 90 is p-type drain region, layers 88,90 are made of silicon with boron dopants , 92 is silicon oxide insulator , 94 is polysilicon gate, 96,98 are silicon oxide insulator layers,100,102 are Aluminum metal contacts.